Aug. 10, 1965 B. B. GOULD 3,199,406

IN-LINE LAUNCHING

Filed June 21, 1961

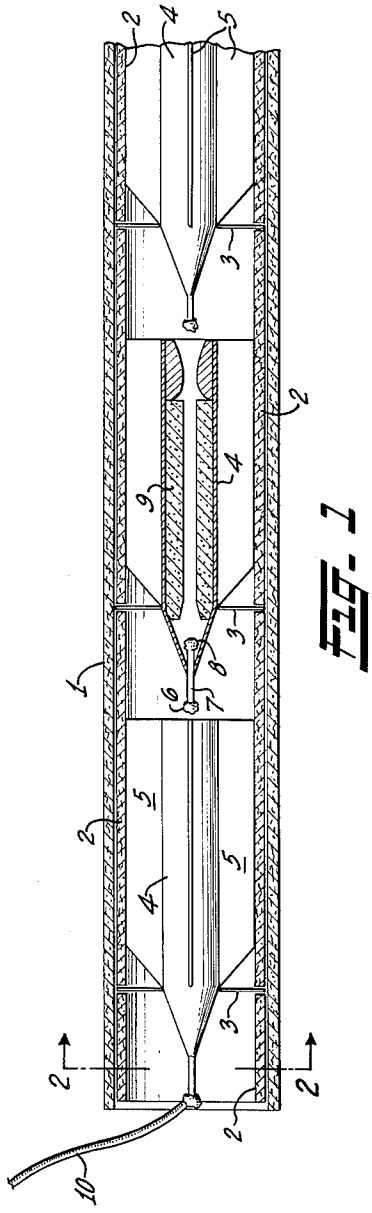

FIG. 1

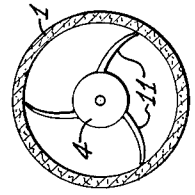

FIG. 3

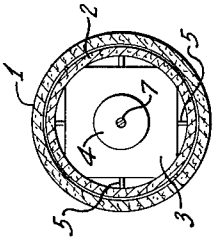

FIG. 2

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IN-LINE LAUNCHING

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1 Claim. (Cl. 89—1.7)

This invention relates to a method and apparatus for launching miniature rockets.

Rockets of major dimensions are launched singly by means of aiming tubes, guiding rails, or launching carriages. The miniature rockets to which this invention relates are extremely small in size wherein the rocket has a diameter of about 1.5 to 3 millimeters and a length of 8 to 35 millimeters. Individual rails or carriages for launching said miniature rockets would be impractical, particularly in configuration where a plurality of miniature rockets are launched simultaneously or in rapid sequence. Further, it is desirable that the launching apparatus hold said miniature rockets with an exact degree of security wherein the rocket may be transported safely to its place of use, and further to insure that full ignition and steady burning of the propellant has been effected before releasing said rocket for flight.

According to the present invention, it has been found that a plurality of such miniature rockets can be launched in sequence from a single tube.

In the drawings forming part of this application:

FIGURE 1 is an enlarged view of miniature rockets mounted in a launching tube, showing a section view of one of said rockets.

FIGURE 2 is an enlarged front view showing the holding method.

FIGURE 3 is an enlarged front view of an alternative holding method.

Turning now to a description of the drawings by reference characters, in FIGURE 1 the launching tube **1** contains spacing tubes **2** to separate the holding diaphragms **3**. The rocket shells **4** are supported concentrically within the tubes by the outer edges of their rectangular fins **5**. Flame from the nozzle of the preceding miniature rocket ignites the external bead of fuze material **6**. Flame is conducted by additional fuze material through the tube **7** to ignite the thermite bead **8**. Suitable fuze materials are pyrotechnics such as Sb_2S_3 and $Ba(NO_3)_2$, boron and KNO_3, aluminum and $KClO_4$, lead mononitroresorcinate and $KClO_3$ mixed with a small amount of binder of plastic or nitrocellulose. The tubing may be nylon, polyethylene, or polyvinyl plastic or of metal, such as hypodermic tubing. Thermite material such as aluminum and Fe_2O_3, or aluminum and Fe_3O_4, may be used alone with a binder or mixed with one of the said pyrotechnics.

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Burning of the thermite ignites the propellant grain **9**, and melts the inner end of the tube **7** shut to form a gas-tight seal.

The first miniature rocket in each tube must be ignited externally from a fuze or electric bridge wire **10**.

In FIGURE 2 a mounted miniature rocket is seen from the front, projecting through the holding diaphragm **3**. Said diaphragm is constructed of material of low shear strength such as onion-skin paper. Upon ignition, the rocket must reach sufficient impulse to cut through the diaphragm **3** with its fins **5**, insuring that the propellant is fully ignited and has reached a steady burning state before the rocket takes off.

FIGURE 3 shows an alternate method of mounting miniature rockets **4** in launching tubes **1**. In this view the fins **5** are slightly larger than the tube diameter and have been bent clockwise to allow the rocket to enter. The friction caused by the spring-like pressure of the bent fins holds the rocket securely for transportation and allows it to launch only after the propellant is fully ignited. Although three fins are illustrated, a larger number might be used.

I claim:

A rocket launching and ignition device comprising in combination an elongated tube, a plurality of rockets within said tube including at least a foremost rocket and a second rocket immediately behind said foremost rocket, each of said rockets having a propellant grain with a central burning port running the length thereof, means for igniting the foremost rocket in the tube, and a pyrotechnic fuse in the nose of the second rocket said fuse protruding beyond the nose of said second rocket, passing through the nose and terminating inside the rocket, whereby the nozzle blast from the foremost rocket will ignite the fuse and thus cause ignition of the second rocket.

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